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Influence of Environmental Factors of Influence on the Volume of Financing in the Agro-industrial Complex

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Abstract:

The availability of financing for agricultural innovation activities through business loans remains one of the most influential factors in the business environment and entrepreneurship development. A gradual improvement in lending conditions with government intervention will attract more customers to banks, which will allow the SME segment to grow and remain competitive, including in the agro-industrial complex. Agribusiness financing and lending issues are of great importance in financial accounting and taxation, so it is necessary to cover this topic by updating important points.

The purpose of the study is to substantiate the theoretical provisions and develop recommendations for improving the accounting for financing and estimating the cost of developing agricultural organizations in the Republic of Kazakhstan.

Keywords: financing; agriculture; agro-industrial complex; agribusiness; environmental factors.

JEL Classification: Q15; Q57; R11.

Introduction

The climate of our planet is changing, which significantly affects agriculture. Environmental change, limited access to drinking water, soil degradation and loss of biodiversity pose a threat to food security. The sharp fluctuations in

food prices observed in recent years have revealed the vulnerability of international food markets to adverse weather conditions and natural disasters. This applies to both Kazakhstan and other regions of the planet.

Most likely, the unpredictability of climatic conditions in a particular region will become a common occurrence on the planet. Agriculture and food production will need to adapt to changing weather patterns in order to make food systems more resilient. The food sector must also take comprehensive and concerted action to reduce greenhouse gas emissions and meet international climate change commitments. The impressive breakthroughs achieved in the life sciences in recent years are leading to a transformation in agro-technologies and farming practices. In particular, advances in the biological, environmental and chemical sciences are helping to improve crop yields, increase the productivity of farm animals and fish, and reduce negative environmental impacts. Increasing the nutritional value of crops through biofortification will lead to improved human health and accelerated weight gain in farm animals. Newly created crops provide the development of new types of food, raw materials for energy production and high-value nutrients. Growing worldwide demand for food, animal feed, various types of fiber and fuel opens up new market opportunities. Developing countries in particular are increasingly in need of adapted agricultural practices and the introduction of new technologies.

1. Literature Review

Many countries are increasing their investment in research and technological development in agriculture. The US, UK, Australia, the Netherlands, South Africa, and Brazil are taking strategic approaches to building their agricultural research systems, with a focus on applied research. Recently, this trend has also been observed in Kazakhstan, which faces the following key challenges:

- Ensuring a sustainable balance between future demand and supply.
- Ensure adequate food price stability.
- Ensuring the availability of food on a global scale in order to eliminate hunger.
- Solving problems related to reducing emissions of hazardous production waste.
- Conservation of biodiversity and natural resources.

In recent years, there has been a growing public distrust towards innovative technologies in terms of their impact on society and the environment. This significantly influences the choice of the direction of scientific research, designed today to meet the growing interest in "organic" and "natural" food, especially "from local producers".

Kazakhstan has great advantages to become a global technology hub that underpins modern sustainable agriculture with low environmental costs, as well as having the necessary resources available to farmers and producers of any size and in all sectors of agriculture (Strategy 2021).

The agri-food sector faces new and important challenges. These challenges are the result of profound changes that have recently affected the national and international economic scenario. In this context, new frontiers of research and exploration seem to have opened up recently. On the one hand, these new frontiers stem from previously unresolved issues; on the other hand, they stem from the growing awareness that natural resources are becoming increasingly limited and under threat (Malorgio *et al.* 2021).

This research study focused on research questions also formulated by Turekulova *et al.* (2022), such as:

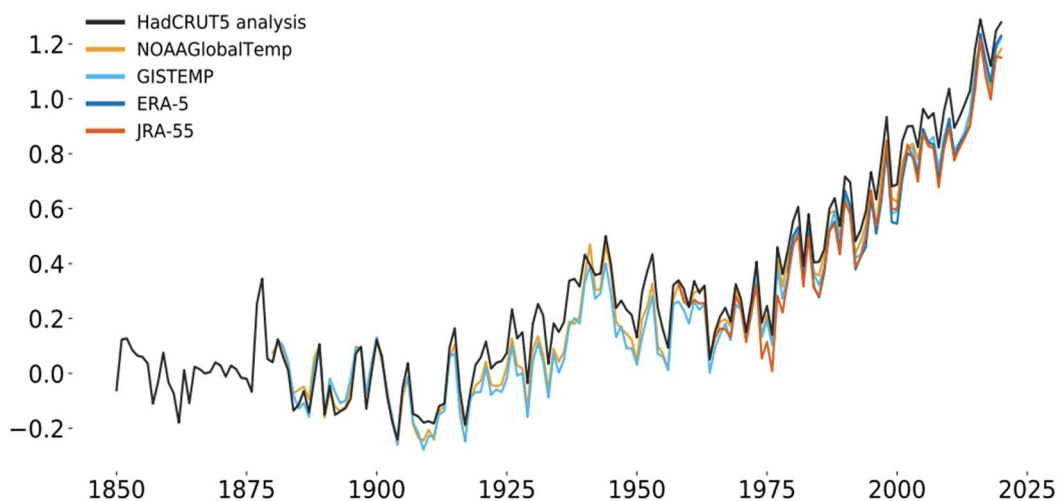
- which practices and performance criteria are considered to analyze sustainability performance in a broad environmental, economic, and social context;
- how they relate to each other, and what methods are used to determine the relationship between sustainability practices and effectiveness.

The agricultural and agri-food sectors have a significant environmental impact due to the large volumes of food, energy, water and packaging waste that these enterprises generate. Eco-innovation is an important opportunity to mitigate this impact. Although eco-innovation aims to reduce environmental damage in the food and agri-food sectors, little attention has been paid by researchers to the role of eco-innovation in agribusiness; however, some findings suggest that it is worth exploring the motivational factors that promote eco-innovation (Ben Amar and Chen 2022). For example, the results of a study by Hultgren, Hiron, Glimskär, Bokkers and Keeling (2022) indicate a direct or indirect causal effect of biodiversity on the welfare of cattle.

A number of recent high-profile publications have drawn attention to agricultural emissions (Poore and Nemecek 2018) and how they can and should be reduced to meet environmental obligations. However, in many studies, the role of agriculture in climate change has some key principles that are increasingly overlooked or misunderstood: in particular, how the impact of methane (CH₄) and nitrous oxide (N₂O), the main greenhouse gases emitted in agricultural production, is different from each other and, in particular, from carbon dioxide (CO₂). Understanding these differences is important not only to understand what reductions in emissions of various gases can achieve in the context of the Paris Temperature Target, but also to inform policy decisions.

The climate is changing, and the consequences of this are already costing people and the planet too much. Countries must commit to achieving net zero emissions by 2050, submitting ambitious national climate plans that will collectively reduce global emissions by 45% from 2010 levels by 2030. And they must act now to protect people from the catastrophic effects of climate change (Figure 1).

Figure 1. Global mean temperature difference



Source: compiled by authors according to <https://public.wmo.int/>

Climate change is defined as an increase in combined surface air temperatures and sea surface temperatures averaged over a 30-year global average. Climate models show consistent differences in regional climate characteristics between today and conditions at 1.5°C global warming, and between 1.5 and 2.0°C warming. These differences are to increase the following indicators: average temperature in most regions of land and ocean, extremely hot weather in most populated areas, strong atmospheric precipitation in a number of regions, as well as the likelihood of drought and lack of precipitation in some regions.

Climate change can also pose a threat to food security through impacts on food crops and plant-based animal feed. Wheat, rice and maize are expected to be worst affected in the tropics and subtropics, with negative climate change impacts on production projected in regions where temperatures rise by 2°C. Global production of food and industrial crops, plant protection and plant biosecurity will also be affected, which include all strategies for assessing and managing the risks posed by infectious diseases, quarantine regulated pests, invasive alien species, living modified organisms in natural and managed ecosystems, and managing these risks.

For example, the results of research study of Hultgren, Hiron, Glimskär, Bokkers and Keeling (2022) indicate a direct or indirect causal effect of biodiversity on the welfare of cattle. Anthropogenic pressure on the atmosphere and water resources was assessed by Stamkulova and Stamkulova (2022) in accordance with equivalent indicators, as a result of which recommendations and conclusions are presented for the determination of data characterizing the impact of agricultural production stages on the environment. The calculation results made it possible to make forecasts and assess the level of environmental safety in agricultural production.

The prospect of sustainable development of the agro-industrial complex and the factors influencing its development is considered as a long-term direction of structural policy at the state level, which makes it possible to create and actively develop enterprises, both small and medium-sized businesses in a global competitive environment, where financial support that requires a series of activities that stimulate the development of the country through a system of indicators.

So, for example, such authors Sultanova and Begeyeva (2022) analyzed the current state of lending to agricultural production by commercial banks, considered the main problems of the availability of bank loans, and developed proposals for the effective financing of enterprises in the agricultural sector of the economy of Kazakhstan in the current economic conditions. The authors show that the provision of agricultural enterprises with credit resources is determined by a number of features inherent in agriculture. Thus, the risky nature of agricultural activities is noted due to specific features and the lack of liquid collateral. The paper notes that banks are attracted to large businesses that are able to provide collateral and, accordingly, qualify for a large amount of credit funds. These factors, along with the financial condition, are decisive for creditor banks. Based on the analysis of bank lending to agricultural enterprises, it was concluded that the current system of lending to agricultural enterprises is not effective enough, since in order to ensure the availability of financial resources for agricultural producers, an

optimal mechanism for the interaction of agricultural producers and commercial banks in the lending procedure is needed.

Among the necessary measures, according to Abdykalieva (2022), the association of small peasants, farmers and households should be included, which will contribute to the efficient use of land, production, labor and other agricultural resources. It is also important to develop infrastructure in the countryside, a system for promoting products “from field to counter”. The special role of cooperating small forms of business lies in the prospects for increasing the incomes of the rural population, which is a priority of the socio-economic policy of the state and one of the tasks of the National Project for the Development of the APKRK for 2021-2025.

The research of Zholmukhanova, Mukaliyeva, Koitanova (2022) confirm that in European countries the agro-industrial complex is managed according to a well-defined model for the development of agricultural production. The EU identifies two main areas of financing for an agricultural producer, which contribute to increasing the competitiveness of agriculture in the world market, protecting the environment in rural areas, improving the quality of life in rural areas and stimulating employment. The European Agricultural Fund for Rural Development annually allocates about 1.35 billion euros to German agricultural entities.

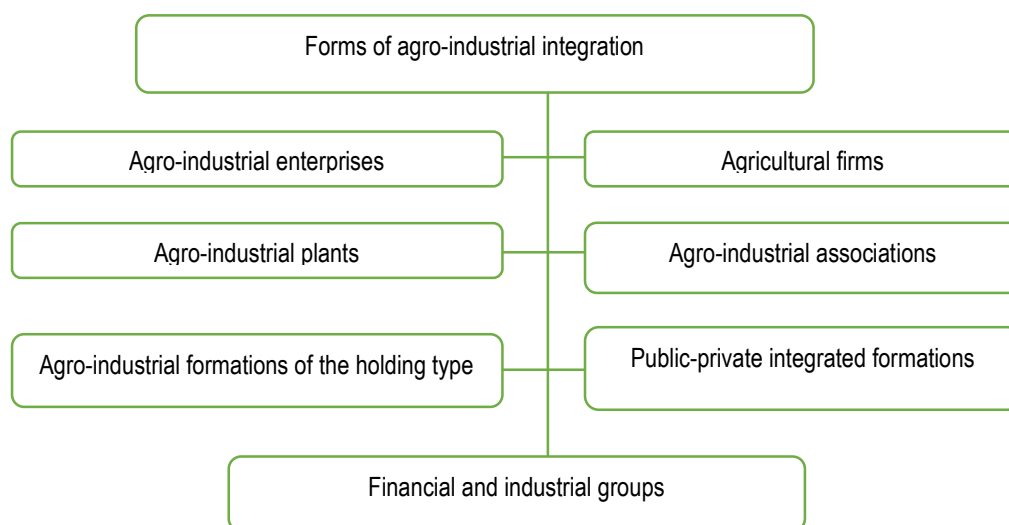
Pilipuk (2022) developed directions for improving the efficiency of the agro-industrial complex, including:

- growth in the productivity and efficiency of industries (preservation and improvement of soil fertility; widespread use of nanopreparations as microfertilizers; development of intensive fodder production);
- sustainable interaction of entities in the agro-food chain (creation of efficient resource zones; optimization and stimulation of the production of a sufficient volume of agricultural raw materials, taking into account the need for processing);
- optimization of foreign economic activity - improvement of the system of export financing (crediting, insurance, compensation for losses);
- activation of innovation and investment activities (introduction of a project financing mechanism; creation of conditions for the growth of investments directed to the introduction of resource-, nature- and energy-saving technologies);
- ensuring the quality of products and raw materials (creating an information base of industry regulations for standard technological processes of production; developing an economic mechanism for stimulating quality).

2. Methodology and Analysis

For the development of the agro-industrial complex, the country has all the necessary resources: land, water and labor. Kazakhstan in terms of area in the world ranks 9th in the world, second among the CIS countries. More than 80% of the total land area is agricultural land. In turn, 80% of agricultural land is pastureland. Large areas of pastureland make it possible to breed up to 30 million head of livestock and poultry in the country.

Figure 2. Main forms of agro-industrial integration



Source: compiled by authors

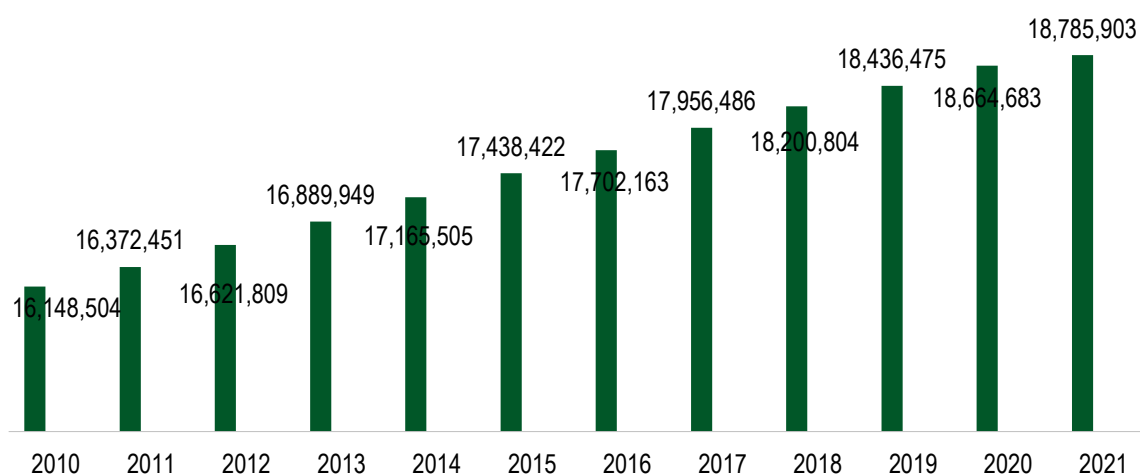
In recent years, processes have taken place in the agricultural sector of the economy of Kazakhstan that affect the nature of the activities of economic entities and change the system of their relationships, property relations, forms of organization of production and management principles. Of paramount importance is the development of

cooperation and agro-industrial integration. The study showed that at the present stage in the agro-industrial complex the following forms of integrated formations have appeared, which are shown in accordance with the Figure 2.

An important condition for successful economic integration in the agriculture of the participating countries is a focus on the development of multi-structural agricultural production, along with personal subsidiary plots of the population and farm (peasant) plots, large enterprises (former collective farms and state farms), as well as vertically integrated agro-industrial associations, agro-combines are being developed (Revenko 2018).

Thus, economic relations in the agricultural sector are quite specific, which necessitates a special theoretical course in the agricultural economy. The role of the agricultural sector in the economy is undeniably high, and the point is not in the creation of GDP. Agriculture of any state is designed to provide the population with the necessary products. Applying modern management tools in agribusiness it is necessary to take into account climatic factors affecting agricultural production. Strategic planning is not yet applied in most agricultural enterprises. Accelerated agribusiness development requires sound strategies and effective management at all levels. All types of financial services in the field of agro-industrial development are aimed at maintaining and increasing the gross output of agricultural products (services), see Figure 3.

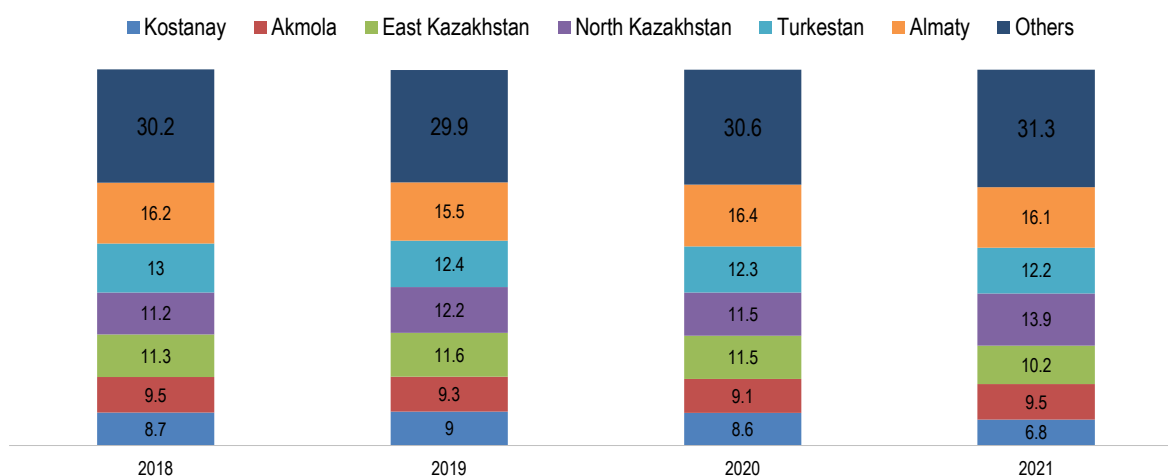
Figure 3. Indicators of gross output of agricultural products (services) for 2010-2021, million tenge



Source: compiled by authors according to www.kazhydromet.kz

The most progressive regions of Kazakhstan in terms of agricultural production are Almaty, North Kazakhstan, Turkestan, East Kazakhstan, Akmola and Kostanay, Figure 4.

Figure 4. Gross output of agricultural products (services) by regions of the Republic of Kazakhstan, in %



Source: compiled by authors according to www.stat.gov.kz

The Agriculture sector ranks third in terms of the contribution to total national emissions of gases with a direct greenhouse effect. In the total GHG flow from agriculture in 2021, methane accounts for 53%, nitrous oxide accounts for 47%. The volume of methane emissions is 12,057 thousand tons of CO₂-eq., nitrous oxide - 10,724 thousand tons of CO₂-eq.

The largest share in the structure of methane emissions in 2021 occupies animal husbandry (96%). Methane emissions from paddy fields and burning crop residues in the fields each account for only 2% of total methane emissions from agriculture. In the structure of nitrous oxide emissions, the leading role is played by the management of agricultural soils (97% of the total N₂O emission). Manure and burning of plant residues account for 1.9 and 0.7%, respectively.

Table 1. GHG emissions from the category "Agriculture", thousand tons of CO₂ eq.

Sources of emissions	2016	2017	2018	2019	2020	2021
Burning agricultural residues in the fields	206	275	283	276	233	254
Agricultural soils	8,115	8,824	9,015	9,511	9,798	10,442

Source: compiled by authors according to www.stat.gov.kz

In 2021 the shares of agricultural soil treatment and internal fermentation were 45% each. Manure management activities account for 6% of total GHG emissions. Insignificantly small shares of emissions are the cultivation of rice in agricultural fields (1.5%) and the burning of crop residues in agricultural fields (1%). According to the results of the inventory, forests and land conversion are sinks of carbon dioxide, and emissions come from ground fires. Thus, with changes in the stocks of woody biomass, a net absorption of CO₂ took place, equal to 4.46 million tons. The largest contribution to the total net GHG sink is made by coniferous and softwood tree species. Land use and land use change result in both absorption and emissions of CO₂. In 2021 net carbon sink in this sector amounted to 1431 thousand tons or 0.6% of total GHG emissions in the country. An estimate of land-use emissions/sinks and land-use change is presented in the Table 2. Increases in carbon sinks are indicated by a plus sign (+) and decreases by a minus sign (-).

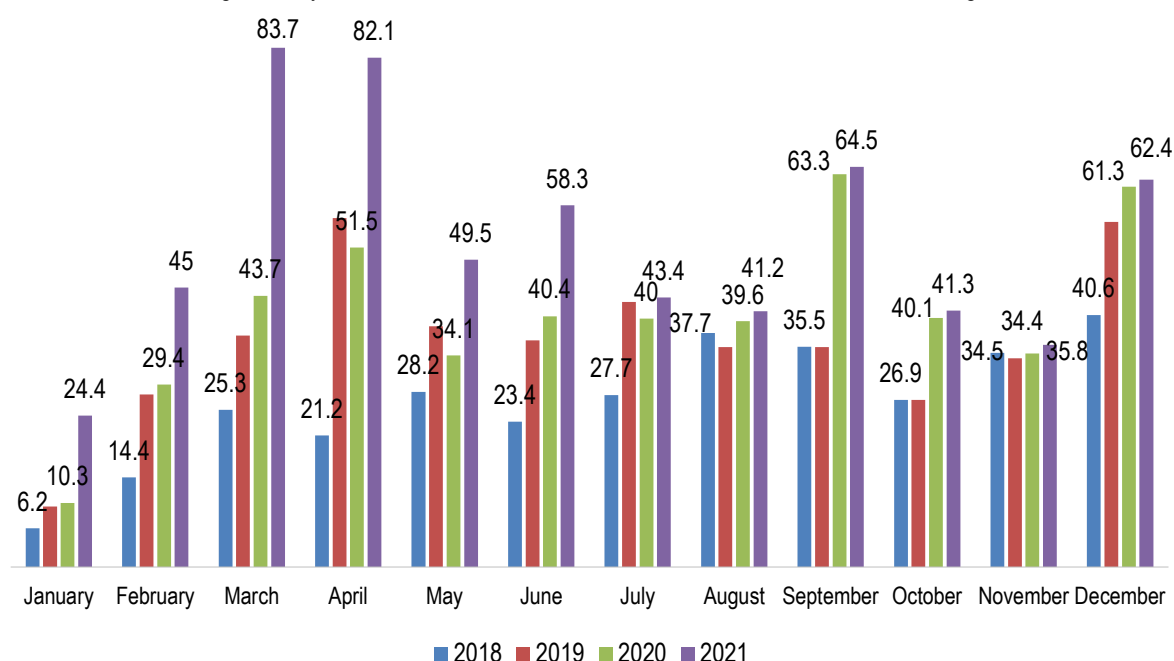
Table 2. Emissions/sinks from PPE categories in Kazakhstan, thousand tons of CO₂

Year	2016	2017	2018	2019	2020	2021
Land use	2,929	2,893	2,866	2,840	2,833	2,798
Land use change	-832	-832	-672	-672	-922	-1,367
Total	2,097	2,221	2,194	2,168	1,911	1,431

Source: compiled by authors according to www.stat.gov.kz

The reduction of carbon dioxide accumulations is associated primarily with the cutting down of orchards. The decommissioning and conversion of agricultural land to pastures resulted in negligible carbon sequestration.

Figure 5. Dynamics of issued loans for the month from 2018-2021, in billion tenge

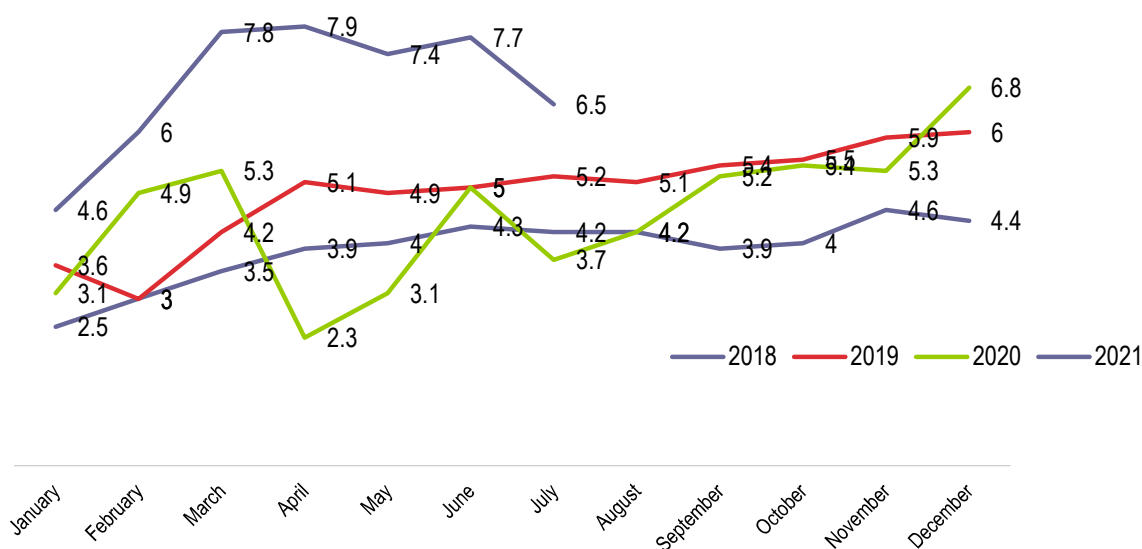


Source: compiled by authors according to www.1cb.kz

Kazakhstan clearly needs a proper climate change adaptation strategy, and the development of a special section in the country's obligations under the Paris Agreement - which means prioritizing adaptation measures in national programs and legislation of the Republic of Kazakhstan. January-July 2021 organizations and individual entrepreneurs operating in the field of agriculture took loans totaling 385.3 billion tenge. This is 52.1% or 132 billion tenge more than in the same period of 2020. The peak of disbursements (as in previous years) occurred at the beginning of spring: in March it amounted to 83.7 billion tenge (+91.5% for the year), in April - 81.1 billion tenge (+57.5%). During the entire first half of the year, the volume of loans issued significantly exceeded the indicators of previous years, returning to them only in July (Figure 5).

The total number of loans issued following the results of 7 months of 2021 loans amounted to 47.9 thousand units. Compared to January-July 2020 the indicator increased by 71.2% or 19.9 thousand units. For four consecutive months (from March to June 2021), the number of loans issued exceeded 7 thousand units, although in the previous at least 3 years it never reached this level (Figure 6).

Figure 6. The number of loans issued for agricultural needs by months for the period from 2018-2021, thousand units



Source: compiled by authors according to www.1cb.kz

But the growth in the number of loans issued is taking place against the backdrop of a decrease in their amounts. The average loan amount issued in July 2021 amounted to 6.7 million tenge compared to 12 million tenge a year earlier. The median value fell more than 3 times: from 1.3 million to 374.9 thousand tenge. In general, average and median loan sizes are now much closer to the level of 2019 than 2020 (especially its post-lockdown period). The share of organizations registered in Qoldau accounted for a third of the total number issued in January-July 2021 agricultural loans. However, they cover 84% of the total funds issued. This suggests that farmers who are not members of the Qoldau system take out more loans, but for much smaller amounts.

A business engaged in agriculture is much more likely to take on new loans than repay old ones. At the end of 7 months of 2021 the difference was 23.6 thousand units. According to the results of January-July 2020, the indicator was less than 11.3 thousand units. The gap is also growing. On average, in 2021, loans in the amount of 14.7 billion tenge are repaid (closed) monthly. The average size of those opened is 55 billion tenge.

Thus, the average monthly difference is 35.3 billion tenge. For comparison: In January-July 2019 this indicator was 27.5 billion tenge, in 2020 less by 0.9 billion tenge. The share of Kostanay, North Kazakhstan and Akmola regions accounts for 45.9% (or 176.9 billion tenge) of the total volume of all loans issued in January-July 2021. Compared to the same period in 2020, the volume increased by 61.1 billion tenge, which provided about 46% of the republican increase. A sharp increase in the number of loans issued is observed in the southern regions. In the Zhambyl and Kyzylorda regions, as well as Almaty, the number of contracts concluded increased by a total of 2 times (Table 3).

Table 3. Issuance of loans in the regional aspect for agricultural needs in 2021

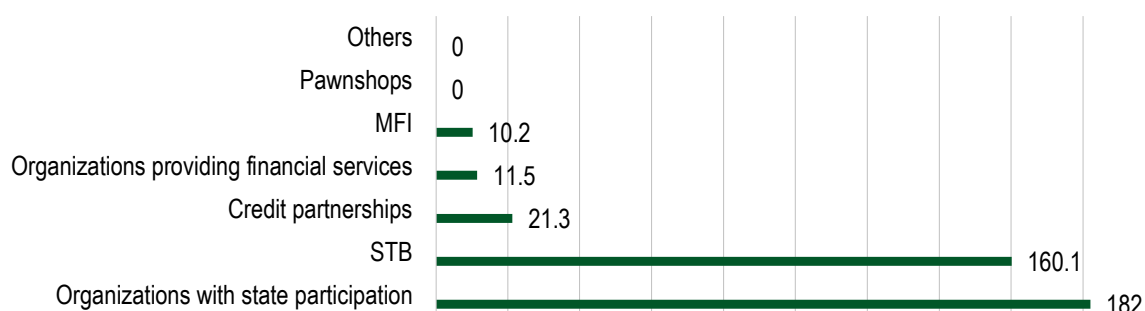
Region	Amount, billion tenge	Change over the year, billion tenge	Change over the year, %	Contracts, units	Change per year, units	Change over the year, %
Kostanay	67,78	29,53	77,2	2.604	1.026	65,0
North Kazakhstan	55,20	15,92	40,5	1.968	684	53,3
Akmola	53,87	15,65	40,9	2.154	907	72,7
East Kazakhstan	33,66	14,73	77,8	3.517	1.124	47,0
Almaty	27,07	8,62	46,7	5.822	1.809	45,1
Almaty city	25,48	8,49	49,9	3.924	2.552	186,0
Pavlodar	20,18	4,95	32,5	1.999	848	73,7
Zhambyl	16,51	6,67	67,8	5.393	2.069	62,2
Aktuibinsk	16,39	5,37	48,8	2.587	1.230	90,6
Karaganda	15,31	5,69	59,1	3.134	1.591	103,1
West Kazakhstan	14,39	3,86	36,6	2.920	1.211	70,9
Turkestan	12,86	1,25	10,7	4.744	1.207	34,1
Kyzylorda	11,61	4,18	56,3	3.620	783	97,1
Nur-Sultan city	4,73	2,08	78,7	1.147	667	139,0
Shymkent city	1,96	-0,83	-29,8	924	429	86,7
Atyrau	1,63	0,49	42,8	658	337	105,0
Mangystau	1,55	0,90	137,5	531	270	103,4

Source: compiled by authors according to www.1cb.kz

In all regions, the bulk of disbursements is formed precisely at the expense of the largest loans in terms of amount. The largest share is in Akmola (91.6%), North Kazakhstan (90.4%) and Kostanay (89.5%) regions. A quarter of all loans issued in 2021 are short-term (loan term does not exceed 6 months). As a rule, these are small loans - their total volume is slightly less than 6.7 billion tenge, or 1.7% of the total volume of loans for the period. The main amount is formed by long-term loans, for a period of more than 5 years (54.1%). These include every fifth loan issued. About 45% (by number) of all short-term loans fall on Almaty, Zhambyl, Kyzylorda and Turkestan regions. In Nur-Sultan, they account for 39.7% of loans issued. The smallest share is in Kostanay region (14.8%). In the Aktoobe region, 39.3% of the total number of loans issued are for a period of more than 5 years. In none of the southern regions, the figure does not even reach 20%.

In 2021, banks will impose competition on organizations with state participation. The volume of loans issued by STBs following the results of 7 months is 160.1 billion tenge; in state organizations - 182 billion tenge. In 6 out of 17 regions, banks are the main creditors. The largest share is in Almaty (75.5% of the volume of loans issued) in accordance with the Figure 7.

Figure 7. The amount of loans issued for the first half of 2021 by types of organizations RK, in bln. tenge



Source: compiled by authors according to www.1cb.kz

The largest share of organizations with state participation is in Pavlodar (75.9%), Mangystau (71.6%) and Atyrau (69.7%) regions. Microfinance organizations are mainly in demand in the south: in Shymkent their share in disbursements is 19.3%, in the Turkestan region is 13.7%, in the Zhambyl region is 10.7%, see Table 4).

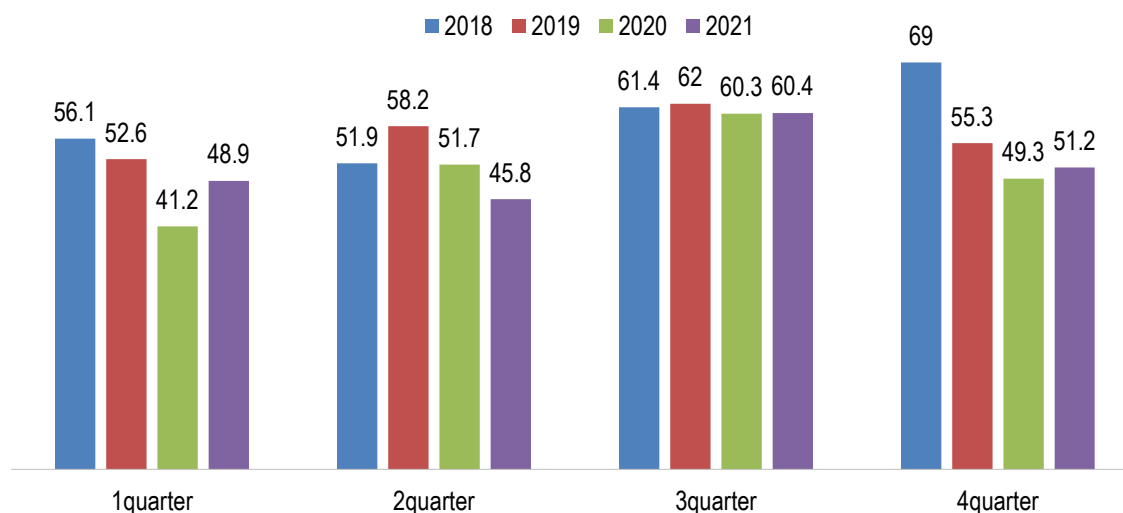
The share of the Agrarian Credit Corporation, the Fund for Financial Support of Agriculture and Kazagrofinance (subsidiaries of KazAgro and Baiterek) traditionally accounts for a significant part of loans issued: in the II quarter, 2021 their share in the total amounted to 45.8% (Figure 8).

Table 4. Issuance of loans by regions and types of organizations for agricultural needs in 2021, million tenge

Region	STB	Credit partnerships	Pawnshops	MFI	Organizations with state participation	Organizations providing financial services	Others
Kostanay	37.978,08	3.305,08	-	389,56	21.378,93	473.139,39	-
North Kazakhstan	18.861,71	1.269,51	-	278,22	33.156,48	1.636,12	0,79
Akmola	27.874,08	4.682,12	-	251,65	19.206,69	1.856,83	0,22
East Kazakhstan	16.507,19	2.153,77	0,30	497,21	13.091,98	1.409,75	1,09
Almaty	13.086,53	1.164,89	-	2.176,60	10.429,53	216,2	0,44
Almaty city	19.242,93	390,55	7,55	528,65	5.262,12	44,98	0,82
Pavlodar	2.999,32	483,42	-	296,09	15.303,39	1.094,48	0,46
Zhambyl	6.736,34	620,61	0,30	1.763,90	7.271,65	116,79	0,25
Aktuibinsk	2.657,20	2.739,31	-	80,74	10.880,42	30,02	1,00
Karaganda	2.957,93	1.984,02	-	316,54	9.908,41	141,56	1,58
West Kazakhstan	3.677,98	522,76	-	313,12	9.868,53	6,66	0,36
Turkestan	2.235,04	28,0	-	1.757,07	8.825,84	10,97	0,05
Kyzylorda	2.046,15	1.354,89	3,50	56,50	7.627,58	10,82	0,5
Nur-Sultan city	1.367,47	270,53	-	388,70	2.462,35	235,36	1,11
Shymkent city	1.004,50	9,00	0,30	378,32	570,24	0,21	0,09
Atyrau	444,93	-	-	47,65	1.135,91	1,04	0,31
Mangistau	402,21	14,91	-	23,48	1.110,39	0	0,23
Total	160.101,52	21.349,03	11,95	10.205,50	182.047,45	11.543,59	9,33

Source: compiled by authors according to www.1cb.kz

Figure 8. The share of the Agrarian Credit Corporation, the Fund for Financial Support of Agriculture and Kazagrofinance in the total volume of disbursements in 2018-2021, %



Source: compiled by authors according to www.1cb.kz

In addition, a significant part of the loans issued by credit partnerships is carried out under state programs, i.e. CTs act as "conductors" of state funds. Part of the loans issued by banks is also carried out within the framework of government programs, but it is impossible to calculate this share. The share of secured lending has significantly decreased. At the end of 7 months of 2021 only 9.8% of the total number of loans issued are secured by collateral. According to the results of January-July 2020, the share was 16%, in 2019 - 18.3%. 13.3% of total loans issued in 2021 are secured by collateral. A year earlier, the figure was much higher - 19.7%. In January-July 2019, the share was 17.3%.

The state acts not only as the main creditor of agriculture, but also significantly helps with subsidies. From the applications submitted by businesses in the first half of 2021, it follows that: a quarter of all fields of the republic

are sown with subsidized seeds; a third of all fields are fed with trace elements and minerals through subsidized fertilizers; volumes of subsidized pesticides will be enough to process all fields of Kazakhstan almost one and a half times.

It is expected that the state will cover about 22% of all business costs for investments made in January-June 2021. And they are most often aimed at updating the agricultural machinery fleet (176.5 billion tenge) and solving irrigation problems (12 billion tenge). In general, the total expected amount of subsidies for seeds, fertilizers and pesticides will be 59.9 billion tenge. And this is only for applications submitted and/or approved in the first half of 2021. The same enterprises received loans for 305.6 billion tenge during the same period. Another 84.3 billion tenge is the budget for subsidies to support livestock in 2021, of which 57.2 billion tenge was paid already at the beginning of August.

The total regional budget for livestock assistance in 2021 is 84.3 billion tenge. Most of these funds (51.8 billion tenge) are intended for the development of animal husbandry. At the same time, three-quarters of the subsidies will go to livestock support. The largest annual budget is planned for the Almaty region (about 16 billion tenge), almost half of which will go to support livestock. The smallest is planned in the Mangistau region (37.7 million tenge). The main area of state support for SMEs in Kazakhstan is financial assistance, which includes interest rate subsidies, loan guarantees and conditional placement of loans for SMEs. The growth of the budget and the results of programs implemented through the Damu Fund are evidenced by the amount of funds raised for SMEs and loans issued to participants in the programs of the Damu Fund (Table 5).

Table 5. Growth of budgets and results of programs implemented through the Damu Fund

Indicator	2015	2016	2017	2018	2019	2020	2021	Total
Conditional the size	172.826	145.434	28.218	40.098	51.140	67.554	56.460	56.1730
Subsidies	23.135	32.646	30.629	30.609	40.793	35.725	64.667	25.8204
Warranty	1.500	2.227	2.287	2.951	3.922	6.493	17.638	3.7018
Total	197.461	180.307	61.134	73.658	95.855	109.772	140.785	856.952
Number of funded projects								
Conditional the size	3.271	3.650	10.145	8.305	18.656	18.930	11.136	74.093
Subsidies	1.497	1.595	2.121	2.287	1.475	2.641	14.763	26.379
Warranty	449	941	951	1.234	1.679	2.470	7.246	14.970
Total	5.217	6.186	13.217	11.826	2.180	24.041	33.145	115.442

Source: compiled by authors according to Damu.kz

Over the past few years, the state, with the help of the Damu Foundation, has provided sufficient funding and concessional lending. So, for example: 297.3 bln. tenge - State Enterprise "DKB 2025" and "EPV", 43.9 billion tenge - SE "Enbek", 7.1 billion tenge - SE "Nurly Zher". The largest amount of funding and concessional lending fell on such regions as SKO, Kostanay, Akmola, as these regions have the most developed agricultural production.

3. Application Functionality

Let us consider the influence of such factors as fixed capital in agriculture and the number of enterprises involved in agribusiness using mathematical modeling methods with the help of statistical data for the years 2010-2021. The results of data approximation by the least squares method are shown in Table 6.

Table 6. The results of the assessment of the equation of gross output of agricultural products

R	0,968
R ²	0,938
Adjusted R ²	0,920
The observed value of the Fisher criterion	4,737
Critical value of the Fisher criterion	4,737 $\alpha = 0,05, K_1 = 2, K_2 = 7$
Gross agricultural output (million tenge) - dependent variable	
Constant	3.251.769,093***
Regression coefficients	
Investments in fixed assets in agriculture (million tenge)	13,338**

Note: * p<0,1; ** p<0,05; *** p<0,01

Source: compiled by authors

As a result of the calculations and analysis we can say that the regression analysis is reliable with 95% accuracy and has a relationship with the considered factors of influence on agribusiness. Based on the calculations

made, the forecast values of the gross output of agricultural products (services) for 2022-2024 will have the following development dynamics (Table 7).

Table 7. Forecast values of gross output (services) of agriculture for 2022-2024

Year	Gross output of agricultural products (services), million tenge	Forecast values of agricultural GDP, million tenge
2010	16.148.504	
2011	16.372.451	
2012	16.621.809	
2013	16.889.949	
2014	17.165.505	
2015	17.438.422	
2016	17.702.163	
2017	17.956.486	
2018	18.200.804	
2019	18.436.475	
2020	18.664.683	
2021	18.785.903	
2022		19.157.727,18
2023		19.407.849,90
2024		19.657.972,60

Source: compiled by authors

As a result of the analysis we have the following conclusions: increase of agricultural production by 13,338 mln tenge is due to increase of financing of agricultural producers by 1 mln. tenge. An increase in the number of single-farm households increases the total agricultural production by 327.907 million tenge. In this case, it shows the extent to which gross agricultural output can change in response to changes in fixed investment and the number of active farms. The elasticity coefficient gives an indication that: the elasticity for investment in fixed capital is: $\bar{E} = 0,832 \%$; results of the elasticity coefficient of such indicator as the number of operating agricultural enterprises: $\bar{E} = 0,911 \%$. An analysis of these elasticity's shows that:

- if investment in fixed capital in agriculture increases by 1% of its average value, then gross agricultural production increases by 0.832% with the number of active farms unchanged.
- if the number of farms increases by 1% of the average value, then gross agricultural output increases by 0.911% of the average value, and the volume of fixed capital formation remains unchanged.
- the results show that the development of the agro-industrial complex is influenced by such factors as investment in fixed capital and the number of enterprises engaged in agricultural production.

Conclusion

The analysis of the study allowed us to draw some conclusions. The Crop production in Kazakhstan faces a number of problems related to effective organization and management, namely. Serious problems leading to low yields are not only adverse weather conditions, but also poor technical and financial equipment of agribusiness. Since almost 70% of the country is located in a continental climate zone with sharp differences in day and night temperatures, which affects the efficiency of livestock development. In addition, the extremely low natural water supply of remote pastures in the south and west, combined with low rainfall (less than 400 mm/year), hinders the proper development of animal husbandry, especially mobile grazing.

In addition to natural factors hindering the development of animal husbandry, there are a number of other problems related to technical, methodological, financial and human issues, such as:

- to improve soil fertility is possible by increasing forage acreage;
- state support for pasture management, including restoration of wells in remote pasture areas.
- in Kazakhstan, the legal provisions on accounting for enterprises in the agricultural sector of the economy are incomplete and need to be improved and clarified. In particular, accounting rules for enterprises using biological assets should be provided.

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